

Amendments to the Specification:

Please replace the following paragraph starting with "Now referring to FIGURE 5" on page 6, lines 21-32 and continuing on page 7, lines 1-7 with the following amended paragraph:

Now referring to FIGURE 5, a flow chart illustrates overall steps involved in a preferred process for recognizing frames according to the current invention. For example, the following steps are performed by the components of the frame recognition device as shown in FIGURE 14. In a step 200, the image input unit 100 inputs document image data generally in a digital format, and the image memory unit 102 stores the document image data. Further in details, the document image data is directly inputted by a document image scanner or a memory storage unit in a personal computer. In the alternative, the document image data is indirectly inputted via a network or from a portable magnetic storage medium. After the document image data is inputted, the image compression unit 101 compresses the data by an OR compression depending upon necessity. The OR compression helps reduce the storage space, the processing time for extracting a black pixel rectangle and an undesirable effect of unclear frame lines. The black pixel rectangle extraction unit 103 extracts a black pixel rectangle from the document image data in the image memory unit 102 in a step 201. The black pixel rectangle extraction is optionally limited to a certain predetermined portion of the document image. The area information for an extracted black pixel rectangle includes coordinates of corners such as an upper left and a lower right, and the area information is stored in the working memory unit 107. As described above, the document image data is in the original format or in the OR compressed format.

Please replace the following paragraph starting with "Now referring to FIGURE 7" on page 10, lines 10-27 with the following amended paragraph:

Now referring to FIGURE 7, a flow chart illustrates steps involved in a second preferred process of the second determination process according to the current invention. Differences in coordinate between the parent rectangle and the corresponding white pixel rectangle are denoted by X_s , Y_s , X_e and Y_e and are determined in a step 400. Based upon the above example with respect to FIGURE 6, the pixel value difference X_s is in pixels and between X_{so} and X_{sw} or $X_s (X_{so}, X_{sw})$. Similarly, other pixel value differences include $Y_s (Y_{so}, Y_{sw})$; $X_e (X_{eo}, X_{ew})$; and $Y_e (Y_{eo}, Y_{ew})$. Among the above determined differences X_s , Y_s , X_e and Y_e , a max value and a minimal value are determined, and the max-min difference between the max value and the minimal value is determined in a step 401. The max-min difference is compared to a second predetermined threshold value such as 2 in a step 402. If the max-min difference is equal to or below the second predetermined threshold value, the second determination result become OK in a step 403. On the other hand, if the difference is above the second predetermined threshold value, the second determination result becomes NG (no good) in a step 404. For example, if the differences X_s , Y_s , X_e and Y_e each have 7, 10, 8 and 7, the max-min difference is $10 - 7$ or 3. Assuming the second predetermined threshold value is 5 pixels, since the max-min difference 3 is below the second predetermined threshold value, the parent rectangle is determined as a frame.

Please replace the following paragraph starting with "Still referring to FIGURE 12" on page 15, lines 1-19 with the following amended paragraph:

Still referring to FIGURE 12, the second preferred embodiment of the frame recognition device further includes an imaginary continuous frame area generation unit 120, a black pixel rectangle integration unit 121 and a frame recognition process unit 123. Conceptually speaking, the second preferred embodiment includes the black pixel rectangle integration unit 121 for integrating black pixel rectangles and the frame recognition process unit 123. However, in actuality, since the frame recognition module 110 may be also used for the frame recognition, the frame recognition process unit 123 is not separately implemented. When the frame recognition module 110 is implemented for use in place of the separate frame recognition process unit 123, the cost reduction is realized in manufacturing of the frame recognition device. Also in the software implementation, the frame recognition module 110 is used for the frame recognition process, the program size is reduced, and the run-time memory requirement may be reduced. Contrarily to the above considerations, when a separate frame recognition process unit 123 is implemented, if different algorithms are used in the separate frame recognition process unit 123, the recognition device as a whole has more flexibility and smart intelligence in recognizing frames. In addition, the second preferred embodiment of the frame recognition device according to the current invention may be combined with a prior art frame recognition device by providing an output interface for the output from the prior art device to the device of the current invention.